

How to interpret and construct multi-modal science texts

Multi-modal science texts combine verbal, visual, mathematical and aural language to represent themes, concepts, relationships or explanations. For students to be able to interpret multi-modal texts successfully they need to be able to:

- understand each part of the text, including the conventions used in each part
- understand the global meanings generated by the integration of these parts.

To be able to construct an effective multi-modal text about a science topic, students need to be able to produce a text that achieves a coherent and persuasive whole by successfully integrating different modes in ways consistent with science conventions.

According to Unsworth (2001), multi-modal texts deal with:

- representational structures (how texts depict events and experiences)
- interactive structures (how texts set up relationships between text makers and viewer or readers)
- compositional structures (how texts organise and emphasise elements and information across different parts of the text).

Representational structures

The following visual conventions are often used to represent scientific concepts and processes through images in multi-modal texts:

- Lines and arrows (vectors) are used to indicate actions or processes. Arrows are often used to signal a sequence of actions, processes in a cycle, a chain of actions or reactions, or simply to signify the part of a structure that is being named or labelled.
- Images are also used to represent how objects or phenomena have been classified into set categories, as in different types of insects, clouds or animals. Sub-categories can be represented through multiple illustrations in written texts or hypertext links in electronic texts.
- Images may show part or whole relationships, sometimes including a magnified version of a part separate from the whole, or as a zoom-in on a key part.
- Images may show only major aspects, or parts of an object, for example, as key working parts in an image of a machine.
- Images may vary from naturalistic, as in photographs, to abstract, as in scientific diagrams of a process, or as a cross section through part of a plant.
- Images may depict time lines as a sequence of events, with different conventions used to indicate the passage of time, such as: numbered images, cartoon boxes, or re-representation of a slightly modified image.
- Symbolic images may be used to represent the qualities of phenomena, as in weather icons in newspapers.

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- Science texts make claims based on evidence and evidence is often summarised and presented as tables and graphs. Tables and graphs present data about the relationships between variables. Data about each variable is presented in a column of the table or on the axis of a graph. So that the magnitude of the variables may be determined by the reader, tables and graphs show the units of measurement for the data.
- Data in tables and graphs illustrates the relationships between the variables depicted. In a table, the reader compares the values of one variable in one column of the table with the values in the next column to determine the relationship between the variables, for example, as X gets bigger so does Y, that is, X may cause Y to increase. Similarly, the pattern in bar heights in a bar graph and the slope of the line in a line graphs shows the relationships between the variables X and Y.

Interactive structures

Images that represent scientific information often avoid the viewer perspective, of looking up or down at the subject, but offer a frontal perspective level to indicate an objective viewpoint.

Another way in which images are presented as objective is through the use of designs to make hidden material visible, such as cut-aways, cross-sections and 'exploded' images of internal parts of the whole.

Compositional structures

Conventions relating to the layout of text across page or screen, including the use of animation to focus viewer attention, are:

- Familiar information is usually put on the left-hand side of the page, with new or more demanding material on the right.
- Layout is usually structured from top to bottom, parallel to print.
- Parts within the layout may be separated from one another, or joined using various framing devices such as: arrows, line borders, blank space, or overlapping or superimposed images. Strong framing indicates sharp separation of parts.
- Emphasis or prominence is achieved in layout through factors such as: size, colour and position of particular images on the page; animation effects; framing of parts; and appeal to viewer interest.
- In tables and graphs, there are conventions regarding which variables are located on columns of tables and axes of graphs. In a table, the variable that is changed (independent variable) is placed in the left hand column and the variable that responds to the change and is often measured (dependent variable) is placed in the right hand column of the table. In graphs, the independent variable is placed on the horizontal axis and the dependent variable is located on the vertical axis of the graph.

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Questions to support students' interpretation of multi-modal texts (Stage 3 of primary schooling)

Orientation

- What do you expect to find in this text? Why?
- What first catches your attention in this text? Why?
- How has the text maker achieved this focus?
- In what order did you view or read the parts of the text?
- Why do you think this was the case?
- Do you think other readers or viewers will follow this same order? Why or why not?

Features and structure of science texts

- How many parts does this text have? What are the purposes of each part? Are the purposes of each part clear?
- Which is the most important part? Are all parts equally important? How can you tell?
- Which part do you think was made first? Why?
- Are all the parts linked together? Why or why not?
- Do the links between parts depict relationships? What types of relationships?
- How well do the parts of this text fit together to make up a whole?
- How effective is the mix of different modes (verbal, visual, mathematical, aural languages) used in this text?
- What other texts are similar to this one? Is this text as clear as these other texts?

What meaning is being communicated?

- What claims or explanations are being made?
- What relationships are being described?

Further analysis

- Who produced this text? Where does this text come from? How do you know?
- Who is expected to read this text? How do you know?
- What claims and evidence are presented in this text? Can you trust them? Why or why not?
- Do any of the parts simply repeat claims made elsewhere in the text, or does each part add something new to the topic?
- Who or what is shown in this text? Who or what has been left out? Why?

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- Could further important claims or evidence be added to this text?
- Does this text give a fair account of its topic? Why or why not? What further information do you need to answer this question?
- What aspects of reality does this text focus on? What is left out? Does it matter if the text only covers some features or possible people in this topic?
- Are different interpretations of the topic of this text possible?
- Do other scientific texts present opposite or different findings on this topic? Which texts should you trust and why? Should you wait for more evidence?
- How might this text layout or content be reconstructed to make its topic clearer or more convincing?
- What does the maker of this text want you to know or do?
- How well did this text meet your expectations?

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Questions to support students' construction of multi-modal texts (Stage 3 of primary schooling)

First steps

- What are the key components of this topic?
- What descriptions, explanations or claims will you make?
- What evidence will you use to support any claims?
- What visual and other resources do you have for making the topic clear and interesting to your readers or viewers?
- What layouts from other texts might be useful as a framework for your text?
- How will you catch the attention of your viewer?
- In what order do you want the parts of your text read or viewed? Why?
- How will you guide your viewers to engage with your text?

Features and structure of science texts

- How many parts should your text have? What are the purposes of each part? How will you make the purposes of each part clear?
- Which is the most important part? How will you show this?
- Are all the parts of your text linked together to make up a whole? How have you made this clear?
- Have you planned an effective mix of different modes (verbal, visual, mathematical, aural language) for this text?

Further points

- What claims and evidence do you want to present in your text? How will you make sure they are reliable?
- Do any parts of your text simply repeat claims made elsewhere in the text, or does each part add something new to the topic?
- Who or what is shown in your text? Who or what has been left out? Why?
- Could further important claims or evidence be added?
- Does your text give a fair and interesting account of its topic?
- Does your text cater for different readers with different background knowledge of the topic?
- How might your text layout or content be reconstructed to make its topic clearer?
- What do you want your readers or viewers to know or do after interpreting your text?
- How well did your text meet your expectations?

Reference

Unsworth, L. (2001). *Teaching Multiliteracies across the Curriculum: Changing contexts of text and images in classroom practice*. Buckingham, UK: Open University Press.